The Radiation Monitoring and Abort System

The Shift Crew's Responsibilities

# What the system does

Protects the silicon against excessive dosage by

- A- Comparing dose rate against programmable threshold
  - If dose rate too high, abort the beam
- B- Comparing dose integrated over past minute against programmable threshold
  - If dose too high, sound alarm
- C- Keeping continuous record of integrated dose. You must watch this.

The hardware

BLMs

CLC

beam pipe
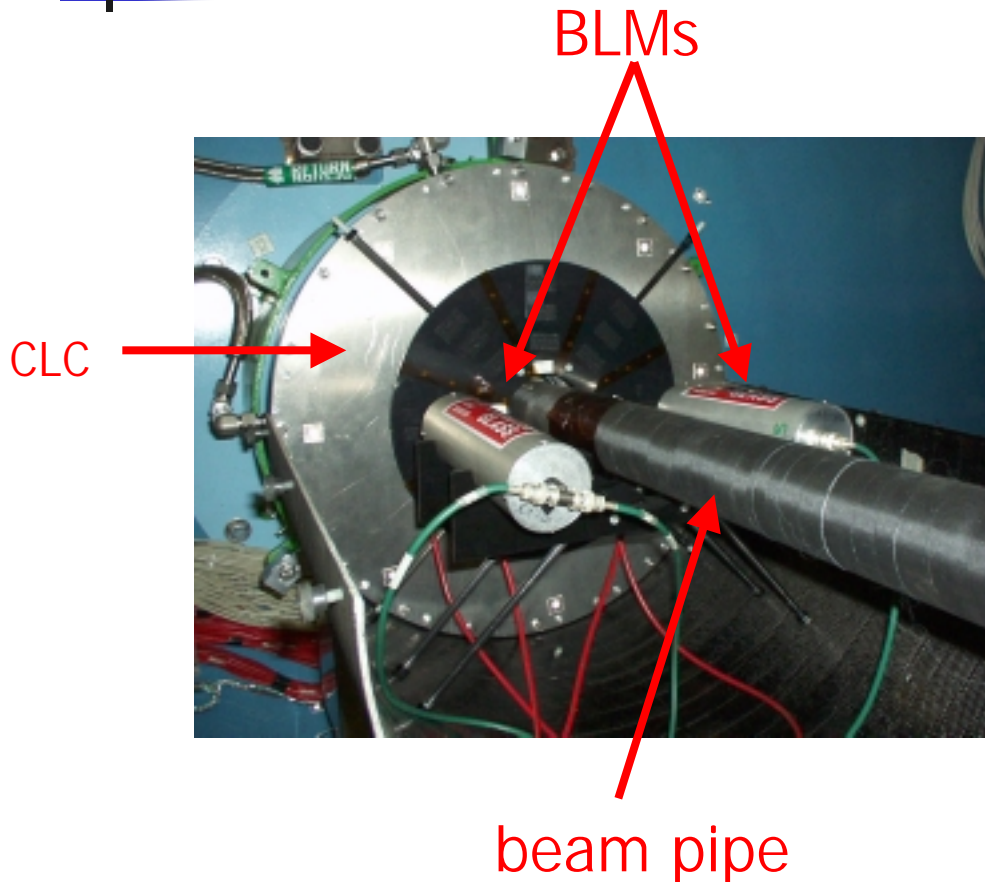
- **B**eam **L**oss **M**onitors: two on E, two on W
- Output signal prop. to dose rate
- Amplified/digitized in CAMAC in control room
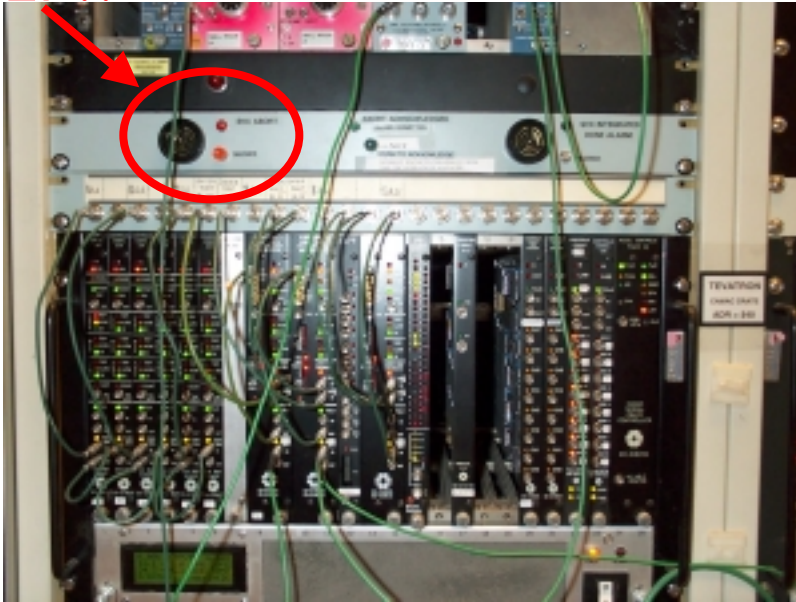- Read out via ACNET

The electronics
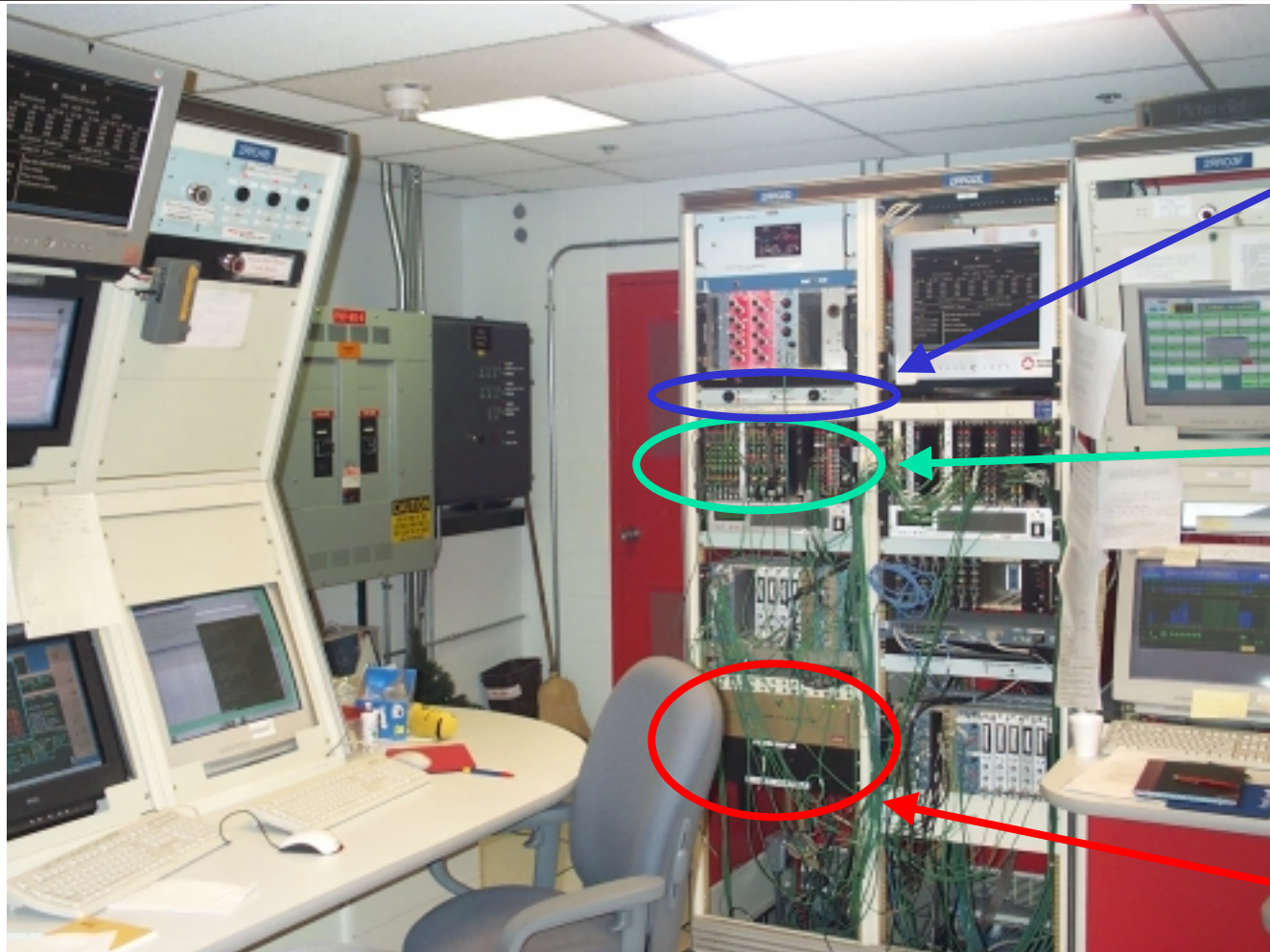
alarm panel

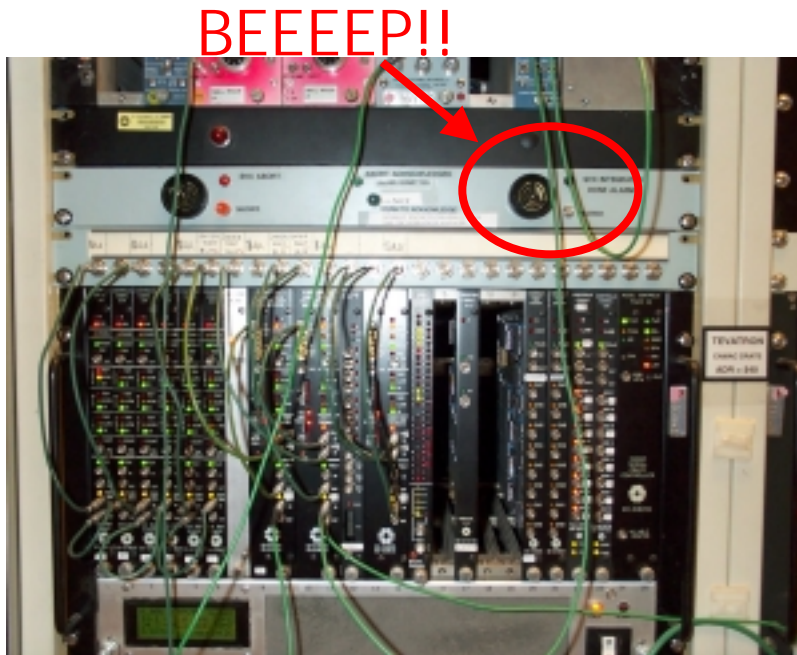CAMAC – digitization and abort logic

HV

A- If there is an abort…

BEEEEP!!

- Don't panic --- what's done is done
- Silence the sono-alarm
- SciCo calls MCR, RDCO, Ops Mgr
  - Probably a good idea to call silicon too
- Reset the system after Ops Mgr gives the OK
  - Step-by-step instructions on the RadMon web pages

B- If there is an alarm...

BEEEEP!!

- Don't panic --- but be concerned

- Silence the sono-alarm

- SciCo should call MCR, RDCO.
  - Probably a good idea to call silicon too

- Be extra-vigilant about watching the E:SVRADs

What are the SVRADs ?
See next slide.

C- Monitoring

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E2                    SVX Rad Scaler Readout          ◆Pgm_Tools◆

  *Global Reset                *Plot FIFO
                               *Select Display Options
                               *Display Logged Data
                               Fifos Recording

                         Rate (R/s) Sum (Rads)
    W Inner BLM             .0035407   74.4743
    W Outer BLM             .0033581   0
    E Inner BLM             .0044799   0
    E Outer BLM             .0026043   74.47369

                        ─────── Messages ───────
Welcome to the SVX Loss Monitor Page
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- ACNET E2 shows real-time readings
- Whenever beam in TeV, you must monitor integrated doses (E:SVRAD0-3)
- Preferred method is a Fast Time Plot
  - Available from "SVX" menu on ACNET E-Z Writer page (E11)

What to watch for
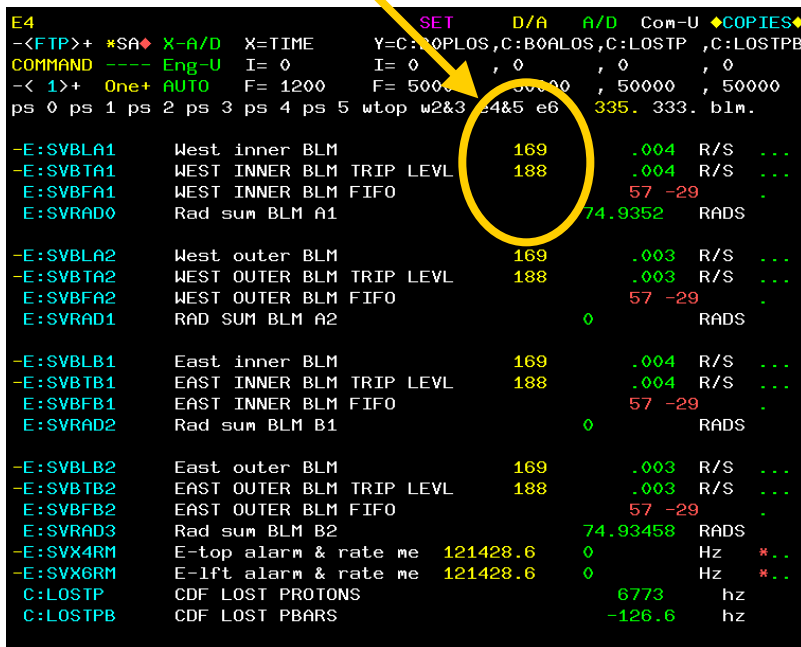
- Anomalous behavior of the E:SVRAD's
  - In time you'll get used to what is anomalous and what isn't
- Large integrated doses w.r.t. three thresholds:
  - "CDF manual alarm" --- SciCo calls MCR
  - "MCR manual abort" --- MCR aborts beam
  - "CDF manual abort" --- CDF aborts beam

  threshold increase ↓

- Integrated dose alarm will probably sound before these thresholds are reached, but be vigilant anyway!

How to manually abort the TeVatron

thresholds

- Step-by-step instructions on RadMon web pages
- In a nutshell:
  - Go to E4
  - Lower automated abort threshold to below pedestal
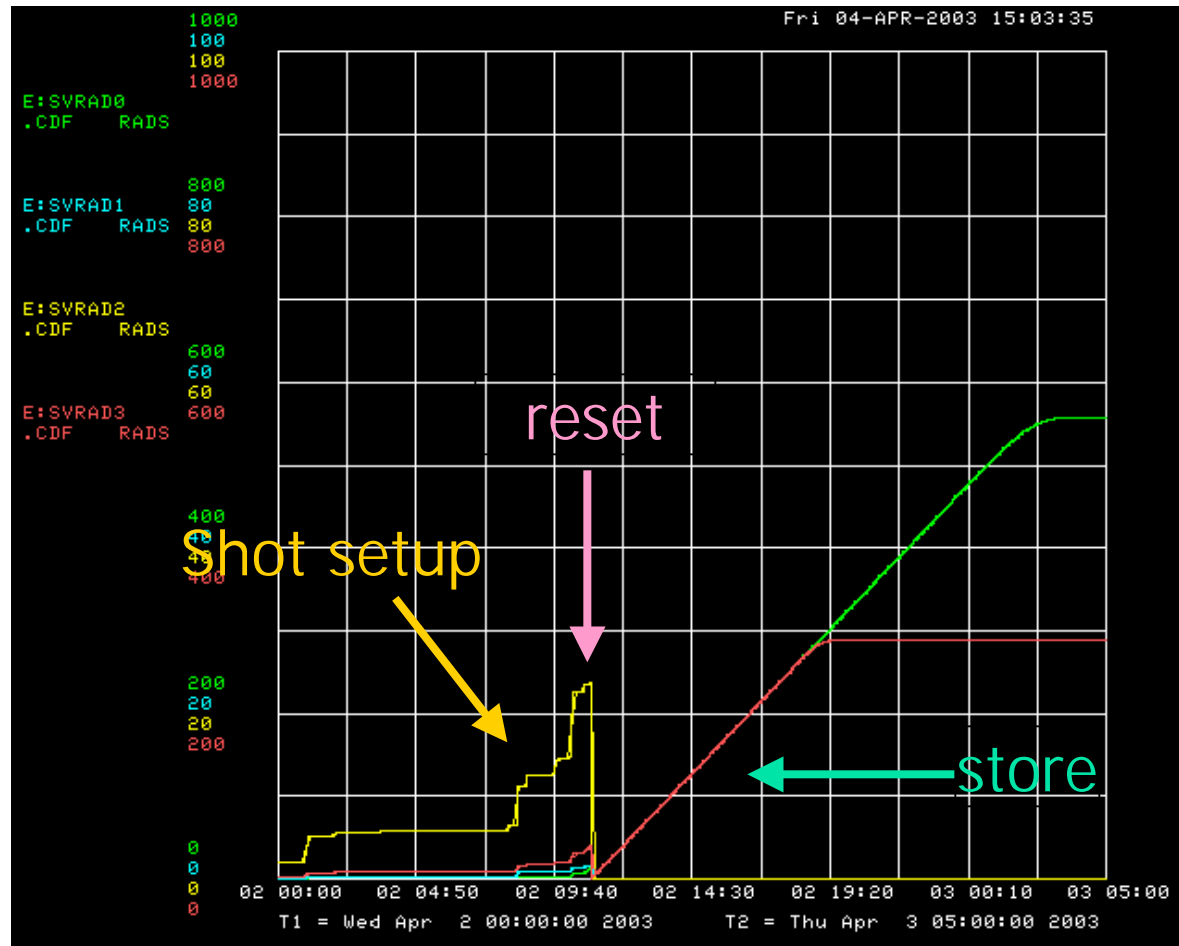 - Let hardware take care of the rest

FAQ

- What are the thresholds?
    - Automated abort: 12 rad/s
    - Integrated dose alarm: 18 rad in past minute
    - Manual alarm/aborts: ~krads, depends on what MCR is doing --- see table posted by ACNET console
- How long will silicon "last?"
    - ~Mrads, so don't worry.
- Has CDF ever pulled the manual abort?
    - Not on purpose.

FAQ, cont.

- When do the E:SVRADs get zeroed?
  - Before shot setup, after scraping, before studies -- - this is done by MCR
- Why are the E:SVRADs flat and boring most of the time?
  - System geared toward catastrophic beam accidents --- tens or hundreds of rad/s
  - Typical beam losses ~mrad/s --- indistinguishable from zero --- an effective integration threshold
  - Threshold for E:SVRAD0,3 is 2 mrad/s, E:SVRAD1,2 is 8 mrad/s (long story)

Typical dose behavior

If you've forgotten everything I just said...

Summary

- Monitor E:SVRADs whenever beam in TeVatron
- If high doses observed, check them against manual alarm/abort threshold table and alert MCR
- Page RDCO for all alarms, aborts, or if something looks weird
  - Andy Hocker, Ricardo Eusebi, Eva Halkiadakis
- Take a spin through the RadMon web pages on one of those boring TeV studies shifts…